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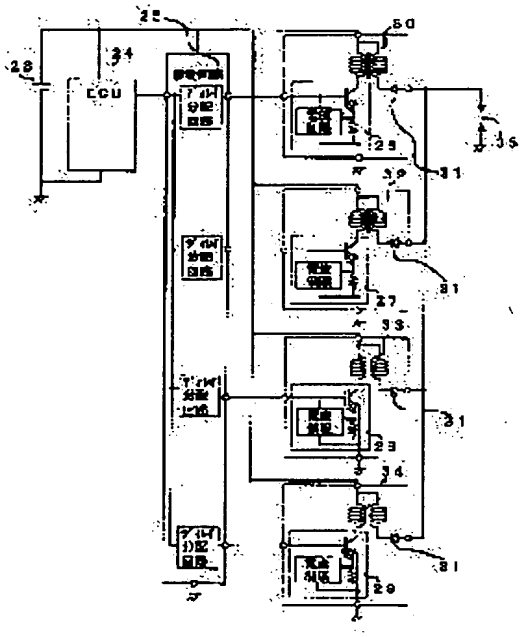
(54) IGNITION DEVICE FOR INTERNAL COMBUSTION ENGINE

(57)Abstract:
PROBLEM TO BE SOLVED: To exactly carry out an ignition control by connecting a high voltage end of an ignition coil connected in parallel through a high voltage diode having a higher breakdown voltage value than a required secondary voltage.
SOLUTION: Since a high voltage diode 31 has a higher breakdown voltage than a required secondary voltage of an engine, a voltage generated at a secondary side of an ignition coil is discharged between electrodes of the ignition plug without receiving an influence of a secondary side of the other ignition plug, thereby, an ignition control is certainly carried out. If a breakdown voltage of a high voltage diode 31 is lower than a required secondary voltage of an engine, a high voltage diode 31 is broken by a voltage generated at a secondary side of the ignition coil at a lower voltage than that of a discharge of the ignition plug and a discharge of the ignition plug is not generated. An output end through the high voltage diode 31 induces a high voltage according to an ignition control signal. Igniter units 26-29 are built in the ignition coil.



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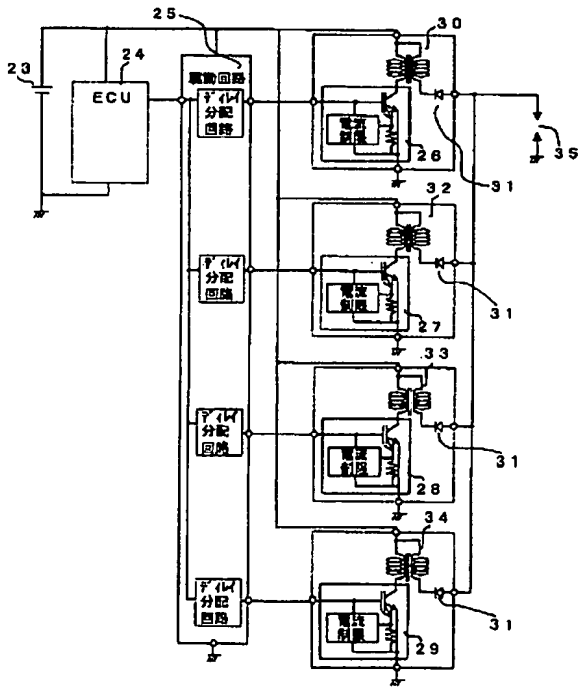
(54)【発明の名称】内燃機関用点火装置

(57)【要約】
【課題】直噴エンジンの着火性向上のために複数の点火コイルを並列に接続した多重点火装置において、点火を確実に行う点火装置を供給する。
【解決手段】エンジンの点火プラグ１個に対して駆動回路と、パワースイッチング素子と、磁気的に結合された一次コイルと二次コイルよりなる点火コイルを並列に二組以上設け、それぞれの点火コイルの二次側はエンジンの要求二次電圧より高いブレークダウン電圧を持つ高圧ダイオードを介して接続することで分離されている構成。

図５



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【特許請求の範囲】

【請求項１】燃料を気筒内に直接噴射する内燃機関の気筒ごとに設けられた点火プラグに対して、磁気的に結合された一次コイルと二次コイルよりなる点火コイルを２個以上並列に設けた点火装置において、前記複数点火コイルの高圧端はブレークダウン電圧をエンジンの要求二次電圧より高い値に設定した高圧ダイオードを介して結合された構成となっていることを特徴とする内燃機関用点火装置。

【請求項２】請求項１において、高圧ダイオードのブレークダウン電圧３５ｋＶ以上に設定したことを特徴とする内燃機関用点火コイル。

【請求項３】ｎ（＞２）個の点火コイルを並列に設けた請求項１または２の点火装置の点火方法であって、第二の点火コイルの一次電流遮断後に再度第一の点火コイルの通電を開始し、順次第二…、第ｎと通電させ、ｎ個目の遮断終了後に再度第一…、第ｎと一次電流を順次遮断させ、且つこの制御を繰り返すことによりｎ個の点火コイルの繰り返し回数倍の多重点火させることを特徴とする内燃機関用点火装置の点火方法。

【請求項４】請求項３において、前記ｎは４であることを特徴とする内燃機関用点火装置の点火方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】内燃機関用点火装置の構造に関する。

【０００２】

【従来の技術】従来点火プラグ１個に対してそれぞれ点火コイルを設けた独立点火方式の点火コイルは、通電開始時に発生する逆電圧を防止するために高圧ダイオードを点火コイル二次巻き線の高圧端あるいは低圧端に設けてあり、前記高圧ダイオードのブレークダウン電圧は一般的に４ｋＶ以下の定格のものを使用している。

【０００３】

【発明が解決しようとする課題】近年のレシプロ型燃料気筒内直接噴霧エンジン（以下直墳エンジン）は従来のキャブレター、またはインジェクターの混合気のように燃焼室内の混合気が均一ではなく、部分的にリッチな混合気が層を成して存在しているため、①着火性が悪い、②点火プラグの電極がくすぶり易い、③タービュランスならびにスワールとリッチな混合気の硝煙作用で吹き消えし易いという問題がある。更に、最近では点火プラグの電極に向けて直接燃料を吹きつけるような制御も検討されており、前記問題点は更に厳しい状況になる。

【０００４】この問題を解決するため特開平3－121273号のように、一個の点火プラグに対して複数個の点火コイルを設け、それぞれの点火コイルの点火タイミングをずらして点火させる多重点火させることが検討されているが、この多重点火に用いる点火コイルは通常の独立点火方式の点火コイルを複数個並列にならべてそれぞれの

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二次側高圧端を接続したものでは一個の点火コイルが発生する高電圧が逆電圧防止ダイオードのブレークダウン電圧以上になった時点で他の点火コイルの二次側に電流が流れてしまい、点火プラグに高電圧を印加できず点火制御が正確に行えなくなってしまうという課題がある。特開平3－121273 号にはダイオードのブレークダウン電圧値について明記されていない。

【０００５】

【課題を解決するための手段】前記課題を解決するために、並列に接続した点火コイルそれぞれの高圧端をブレークダウン電圧がエンジンの要求二次電圧よりも高い値とした高圧ダイオードを介して接続することによりそれぞれの点火コイルの二次側を分離することができ、一個の点火コイルが発生する高電圧が直接点火プラグに印加されて点火制御を正確に行うことが可能となり本課題を解決することができる。

【０００６】

【発明の実施の形態】上記本発明の構成による作用を説明する。

【０００７】本発明の構成は、点火プラグ１個に対して駆動回路と、パワースイッチング素子と、磁気的に結合された一次コイルと二次コイルよりなる点火コイルを並列に二組以上設け、それぞれの点火コイルの二次側はエンジンの要求二次電圧より高いブレークダウン電圧を持つ高圧ダイオードを介して接続することで多重点火を可能としたものである。

【０００８】図１に、通常のディストリビュータ配電方式の点火システム構成例を示す。１はバッテリー、２はＥＣＵ、３は点火コイル、４は点火プラグ、５はイグナイタユニットを示す。イグナイタユニット５は点火コイル内に内蔵されており、保護機能として電流制限回路を設けている。ＥＣＵ２の出力段から適正な点火タイミングでイグナイタユニット５のパワートランジスタのベースにＨＩＧＨ，ＬＯＷのパルスを出力し、これによってパワートランジスタ５が通電，遮断され点火コイル３の二次側に高電圧を発生する。点火コイル３の一次巻線６の一端はバッテリーのプラス電極に接続されており、もう一端はイグナイタユニット５のコレクタに接続され、二次巻線７の高圧側の一端はディストリビュータ８を介して点火プラグ４に接続され、二次巻線７のもう一端はアースに接続されている。

【０００９】図２に、図１の点火システムの動作波形を示す。９はＥＣＵから出力される点火信号、１０は点火コイル３の一次側を流れる一次電流、１１は点火コイル３の二次側に発生しディストリビュータ８を介して点火プラグ４の電極間に発生する二次電圧である。ＥＣＵ２で計算された適正な通電タイミングによって点火信号９がＨＩＧＨになり、これに同期して一次電流１０が一次巻線６のインダクタンスと抵抗の時定数分の遅れを持って流れ始める。この時の電流変化分でプラス側に不要な

逆電圧が発生し、この発生電圧が点火プラグに火花を飛ばすのに十分な値以上になると点火プラグ電極間に放電が起こるがディストリビュータ配電方式では配電ロータの位置とロータギャップの関係で特に問題にならない。通電開始後、適正な点火タイミングで点火信号がＬＯＷになり、一次電流が遮断され点火プラグ４の電極間に高電圧を発生する。点火プラグ４の電極間に発生する電圧はエンジンの要求二次電圧で放電され、この要求二次電圧は燃焼室の形状，圧縮比，運転状態および点火プラグの摩耗状態で変化するが一般的に３３ｋＶ以下である。

【００１０】図３に、独立点火方式の点火システム１気筒分の構成例を示す。１２はバッテリー、１３はＥＣＵ、１４は点火コイル、１５は点火プラグ、１６はイグナイタユニット、１７は逆電圧防止用高圧ダイオードを示す。点火コイル１４の一次巻線１８の一端はバッテリーのプラス電極に接続されており、もう一端はイグナイタユニット１６のコレクタに接続され、二次巻線１９の高圧側の一端は逆電圧防止用高圧ダイオード１７を介して点火プラグ１５に直接接続され、二次巻線１９のもう一端はアースに接続されている。前記逆電圧防止用高圧ダイオードのブレークダウン電圧は通電開始に発生する逆電圧より若干高い値であれば十分であり通常４ｋＶ以下の値となっている。

【００１１】図４に、独立点火方式の点火システムの動作波形を示す。２０はＥＣＵから出力される点火信号、２１は点火コイル１４の一次側を流れる一次電流、２２は点火コイル３の二次側に発生し点火プラグ１５の電極間に発生する二次電圧である。ＥＣＵ２で計算された適正な通電タイミングによって点火信号２０がＨＩＧＨになり、これに同期して一次電流２１が一次巻線６のインダクタンスと抵抗の時定数分の遅れを持って流れ始める。この時の電流変化分でプラス側に不要な誘導電圧が誘起されるが、逆電圧防止用ダイオードでプラス側の電圧がブロックされているため点火プラグ１５の電極にはプラス電圧が発生しない。通電開始後、適正な点火タイミングで点火信号がＬＯＷになり、一次電流が遮断され点火プラグ１５の電極間に高電圧を発生する。

【００１２】図５に、本発明の一実施例を表す点火装置の構成例を示す。２３はバッテリー、２４はＥＣＵ、２５はＥＣＵからの点火制御信号によって多重点火信号を出力するディレイ分配回路よりなる駆動回路、２６は前記駆動回路の出力信号によってＯＮ・ＯＦＦ制御される一つ目のイグナイタユニット（１）、２７は二つ目のイグナイタユニット（２）、２８は三つ目のイグナイタユニット（３）、２９は四つ目のイグナイタユニット（４）、３０は磁気的に結合された一次コイルと二次コイルと高圧ダイオード３１よりなる点火コイル（１）、２２は点火コイル（２）、２３は点火コイル（３）、２４は点火コイル（４）、３５は点火プラグであり、前記高圧ダイオードはエンジン要求二次電圧より高いブレークダウン電圧を持っているため点火コイル（ｘ）の二次側に発生した電圧は、他の点火コイルの二次側の影響を受けずに点火プラグの電極間で放電するため点火制御が確実に行われる。もしも、前記高圧ダイオードのブレークダウン電圧がエンジンの要求二次電圧より低い場合には点火コイル（ｘ）の二次側に発生した電圧により点火プラグが放電するよりも低い電圧で他の点火コイルの高圧ダイオードがブレークし電流を引き抜いて点火プラグでの放電が発生しない。高圧ダイオードを介した出力端は点火プラグに接続され点火制御信号に応じてこの部分に高電圧を誘起させる。イグナイタユニットはそれぞれ点火コイルに内蔵されており、そのパワースイッチング素子はＩＧＢＴで構成され、保護機能として電流制限回路を設けている。

【００１３】図６に、図５の動作波形の一例を示す。本実施例は４組の点火コイルを２回繰り返し放電させるトータル８回の多重点火である。１２７はＥＣＵからの点火制御信号、１２８は駆動回路の出力信号（１）、１２９は駆動回路の出力信号(２)、１３０は駆動回路の出力信号（３）、１３１は駆動回路の出力信号（４）、１３２はコイル１の一次電流、１３３はコイル２の一次電流、１３４はコイル３の一次電流、１３５はコイル４の一次電流、１３６は本発明の多重点火装置出力電圧である。本実施例では、それぞれのコイルの一次電流遮断タイミングは0.3ｍｓ程度遅れを持たせており、８回のピーク二次電圧発生を３ｍｓ程度内に終了させる制御としている。この時間とクランク角度の関係は$\theta = 6NT$の式によって算出でき、たとえばエンジン回転数８００ｒ／min 時の３ｍｓはクランク角度にして１４．４°となるため、本実施例は８００ｒ／minにおいて１４．４°中８回の発生ピーク二次電圧を得るシステムとなっている。

【００１４】

【発明の効果】以上に述べた本発明によると、並列に設けられた複数個の点火コイルの二次側を分離することが出来、点火コイルが発生する高電圧が直接点火プラグに印加されて点火制御を正確に行うことが可能となるため直墳エンジンの持つ①着火性が悪い、②点火プラグの電極がくすぶり易い、③タービュランスならびにスワールとリッチな混合気の硝煙作用で吹き消えし易いという問題点を解決できる多重点火装置を供給することが可能となる。

【図面の簡単な説明】

【図１】ディストリビュータ方式の点火システム。

【図２】ディストリビュータ方式の点火システムの動作波形例。

【図３】独立点火方式の点火システム（１気筒分）。

【図４】独立点火方式の点火システムの動作波形例（１気筒分）。

【図５】本発明の点火装置の構成例。

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【図６】本発明の点火装置の動作波形例。

【符号の説明】

１，１２，２３…バッテリー、２，１３，２４…ＥＣＵ、３，１４…点火コイル、４，１５，３５…点火プラグ、６，１８…一次巻線、７，１９…二次巻線、９，２０…点火信号波形、１０，２１…一次電流波形、１１，２２…二次電圧波形、１６，２６，２７，２８，２９…イグナイタユニット、１７，３１…高圧ダイオード、２５…駆動回路、３６…多重点火装置出力電圧。

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【図１】

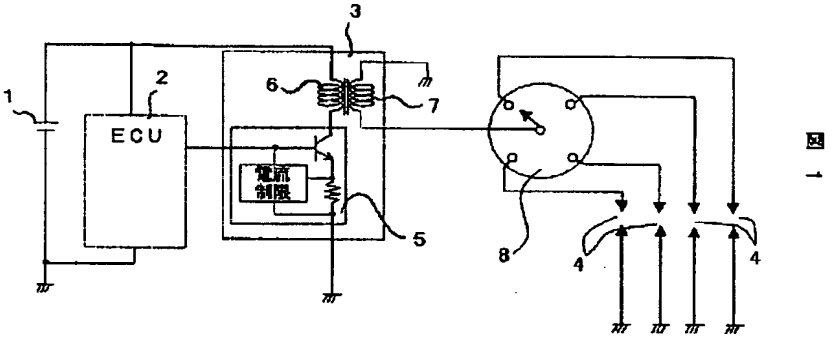


図１

【図２】

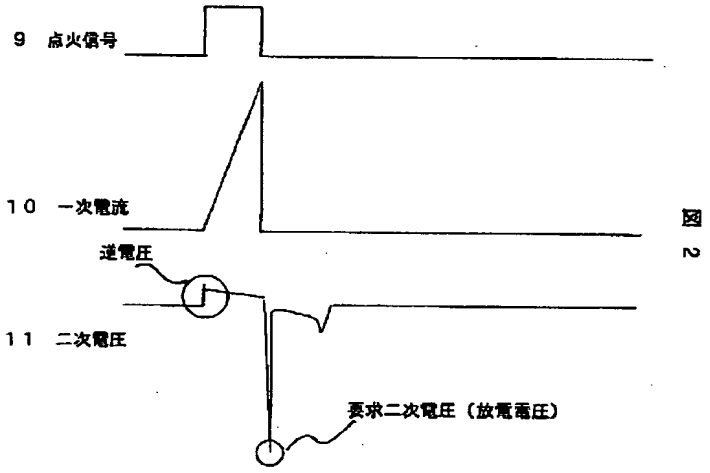
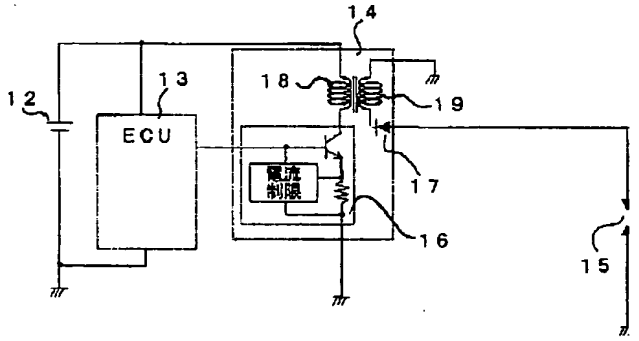


図２

【図３】

図 3



【図４】

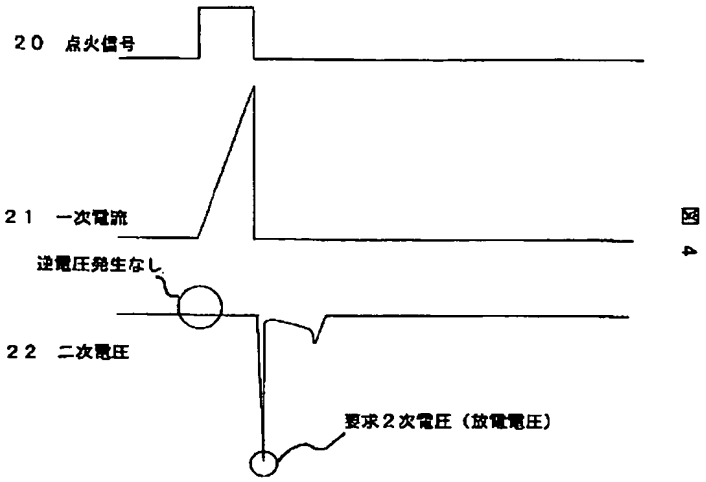
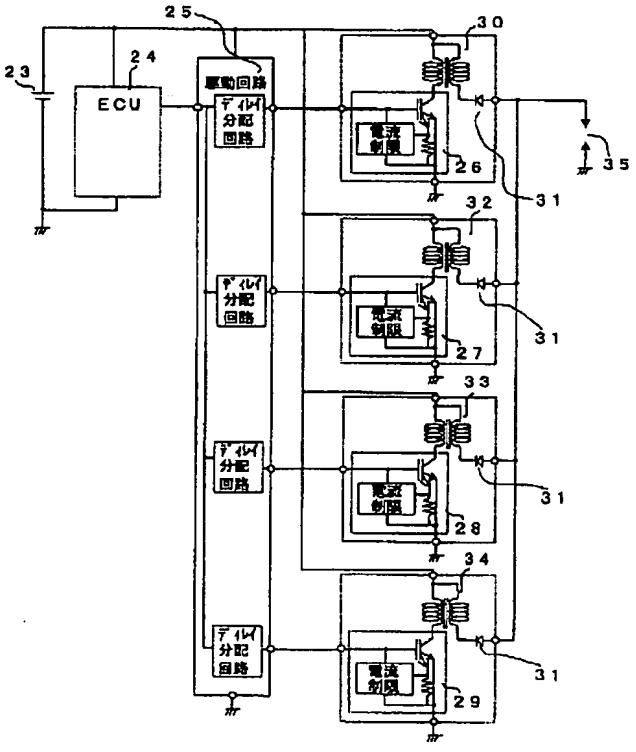


図４

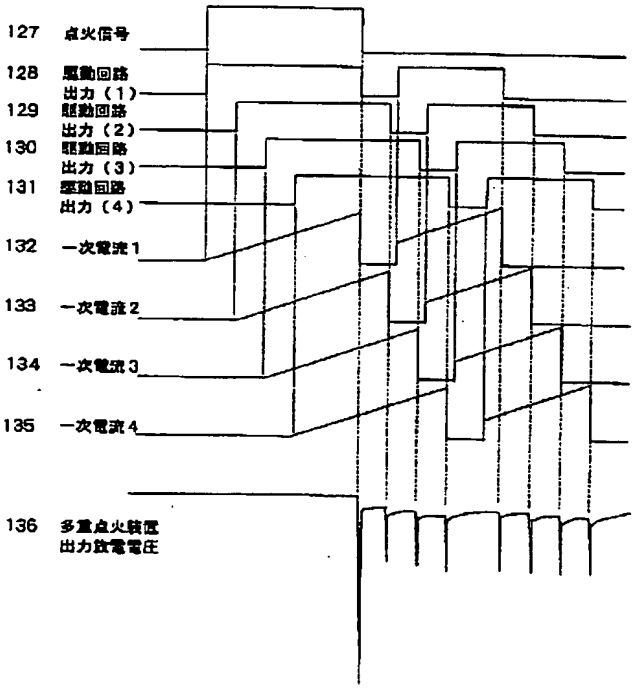
【図５】

図　5



【図６】

図　6



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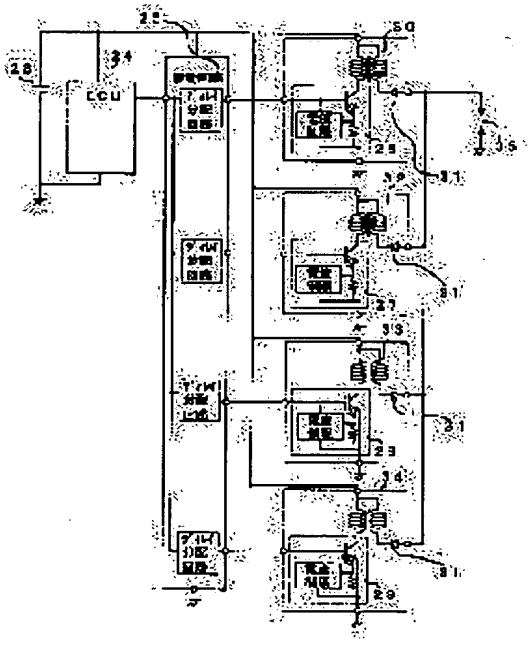
(54) IGNITION DEVICE FOR INTERNAL COMBUSTION ENGINE

(57) Abstract:

PROBLEM TO BE SOLVED: To exactly carry out an ignition control by connecting a high voltage end of an ignition coil connected in parallel through a high voltage diode having a higher breakdown voltage value than a required secondary voltage.

SOLUTION: Since a high voltage diode 31 has a higher breakdown voltage than a required secondary voltage of an engine, a voltage generated at a secondary side of an ignition coil is discharged between electrodes of the ignition plug without receiving an influence of a secondary side of the other ignition plug, thereby, an ignition control is certainly carried out. If a breakdown voltage of a high voltage diode 31 is lower than a required secondary voltage of an engine, a high voltage diode 31 is broken by a voltage generated at a secondary side of the ignition coil at a lower voltage than that of a discharge of the ignition plug and a discharge of the ignition plug is not generated. An output end through the high voltage diode 31 induces a high voltage according to an ignition control signal. Igniter units 26-29 are built in the ignition coil.



* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] It is related with the structure of the ignition for internal combustion engines.
[0002]
[Description of the Prior Art] In order that the ignition coil of the independent ignition method which prepared the ignition coil to one ignition plug, respectively conventionally may prevent the reverse voltage generated at the time of energization initiation, high-pressure diode is formed in the high-pressure edge or low voltage edge of ignition coil secondary winding, and generally the breakdown voltage of said high-pressure diode is using the thing with a rating of 4kV or less.
[0003]
[Problem(s) to be Solved by the Invention] The direct fuel-spray engine in recent years in a reciprocating mold fuel gas column (following **** engine) does not have so uniform the gaseous mixture of a combustion chamber as the conventional carburetor or the gaseous mixture of an injector, and since rich gaseous mixture accomplishes a layer and exists partially, it has the problem of being easy to carry out the blowoff of the ** ignitionability to ** turbulence and the swirl in which the bad electrode of ** ignition plug tends to smolder in a powder smoke operation of rich gaseous mixture. Furthermore, recently, control which sprays a direct fuel towards the electrode of an ignition plug is also considered, and said trouble becomes a still severer condition.
[0004] Although the thing which prepare two or more ignition coils to the ignition plug of a piece, and shift the ignition timing of each ignition coil and it is made to light like JP,3-121273,A and to do for multiplex ignition is examined in order to solve this problem It is what two or more ignition coils used for this multiplex ignition could be located in a line with juxtaposition in the ignition coil of the usual independent ignition method, and connected each secondary high-pressure edge. When the high voltage which the ignition coil of ****** generates becomes more than the breakdown voltage of reverse voltage prevention diode, current flows to secondary [of other ignition coils], the high voltage cannot be impressed to an ignition plug, but the technical problem of it becoming impossible to perform ignition control correctly occurs. It is not clearly written in JP,3-121273,A about the breakdown voltage value of diode.
[0005]
[Means for Solving the Problem] By connecting through high-pressure diode with which breakdown voltage made a high-pressure edge of each ignition coil linked to juxtaposition a value higher than engine demand secondary voltage, in order to solve said technical problem, secondary [of each ignition coil] can be separated, a high voltage which an ignition coil of a piece generates becomes possible [it being impressed by direct ignition plug and performing ignition control correctly], and this technical problem can be solved.
[0006]
[Embodiment of the Invention] The operation by the configuration of above-mentioned this invention is explained.
[0007] The configuration of this invention prepares in juxtaposition 2 or more sets of ignition coils which consist of a primary coil magnetically combined with the drive circuit and the power switching element to one ignition plug, and a secondary coil, and secondary [of each ignition coil] enables multiplex ignition by connecting through high-pressure diode with breakdown voltage higher than engine demand secondary voltage.
[0008] The example of an ignition-system configuration of the usual distributor type of distribution system is shown in drawing 1 . In 1, an ignition coil and 4 show an ignition plug and, as for a dc-battery and 2, 5 shows an ignitor unit, as for ECU and 3. The ignitor unit 5 is built in in the ignition coil, and has prepared the current-limiting circuit as a protection feature. The pulse of HIGH and LOW is outputted to the base of the power transistor of the ignitor unit 5 by proper ignition timing from the output stage of ECU2, and it is energized by the power transistor 5, it is intercepted by this, and generates the high voltage in secondary [of an ignition coil 3] by

it. The end of the primary winding 6 of an ignition coil 3 is connected to the plus electrode of a dc-battery, an end is already connected to the collector of the ignitor unit 5, the end of the high-tension side of a secondary winding 7 is connected to an ignition plug 4 through a distributor 8, and the end which will be accepted secondary-winding 7 is connected to the ground.

[0009] The wave of the ignition system of drawing 1 of operation is shown in drawing 2 . The ignition signal with which 9 is outputted from ECU, the primary current to which 10 flows the upstream of an ignition coil 3, and 11 are secondary voltage which generates in secondary [of an ignition coil 3] and is generated in inter-electrode [of an ignition plug 4] through a distributor 8. By the proper energization timing calculated by ECU2, the ignition signal 9 is set to HIGH and the primary current 10 begins to flow with the inductance of a primary winding 6, and the delay for a time constant of resistance synchronizing with this. Unnecessary reverse voltage occurs in a plus side in a part for the current change at this time, and if it becomes beyond sufficient value for this generated voltage to fly a spark to an ignition plug, although discharge will take place to ignition plug inter-electrode, it does not become a problem due to the location of distribution-of-electrical-energy Rota, and the Rota gap especially at the distributor type of distribution system. An ignition signal is set to LOW by proper ignition timing after energization initiation, the primary current is intercepted, and the high voltage is generated in inter-electrode [of an ignition plug 4]. The voltage generated in inter-electrode [of an ignition plug 4] discharges with engine demand secondary voltage, and although this demand secondary voltage changes in the state of wear of the configuration of a combustion chamber, a compression ratio, operational status, and an ignition plug, generally it is 33kV or less.

[0010] The example of a configuration for an ignition-system 1 cylinder of an independent ignition method is shown in drawing 3 . 12 -- in a dc-battery and 13, an ignition plug and 16 show an ignitor unit and, as for ECU and 14, 17 shows the high-pressure diode for reverse voltage prevention, as for an ignition coil and 15. The end of the primary winding 18 of an ignition coil 14 is connected to the plus electrode of a dc-battery, an end is already connected to the collector of the ignitor unit 16, direct continuation of the end of the high-tension side of a secondary winding 19 is carried out to an ignition plug 15 through the high-pressure diode 17 for reverse voltage prevention, and the end which will be accepted secondary-winding 19 is connected to the ground. If the breakdown voltage of said high-pressure diode for reverse voltage prevention is a value [a little] higher than the reverse voltage generated in energization initiation, it is enough and usually serves as a value of 4kV or less.

[0011] The wave of the ignition system of an independent ignition method of operation is shown in drawing 4 . The ignition signal with which 20 is outputted from ECU, the primary current to which 21 flows the upstream of an ignition coil 14, and 22 are secondary voltage which generates in secondary [of an ignition coil 3] and is generated in inter-electrode [of an ignition plug 15]. By the proper energization timing calculated by ECU2, the ignition signal 20 is set to HIGH and the primary current 21 begins to flow with the inductance of a primary winding 6, and the delay for a time constant of resistance synchronizing with this. Although induction of the unnecessary induced voltage is carried out to a plus side by part for the current change at this time, since the voltage by the side of plus is blocked with the diode for reverse voltage prevention, positive voltage does not occur in the electrode of an ignition plug 15. An ignition signal is set to LOW by proper ignition timing after energization initiation, the primary current is intercepted, and the high voltage is generated in inter-electrode [of an ignition plug 15].

[0012] The example of a configuration of the ignition which expresses one example of this invention to drawing 5 is shown. The drive circuit where 23 consists of a delay distribution circuit where a dc-battery and 24 output ECU with the ignition control signal from ECU, and 25 outputs a multiplex ignition signal, The one-eyed ignitor unit by which ON-OFF control of 26 is carried out with the output signal of said drive circuit (1), The second ignitor unit (2) and 28 27 The third ignitor unit (3), The ignition coil with which 29 consists of the fourth ignitor unit (4), the primary coil and secondary coil with which 30 was combined magnetically, and high-pressure diode 31 (1), 22 an ignition coil (3) and 24 for an ignition coil (2) and 23 An ignition coil (4), The voltage which 35 was an ignition plug, and was generated in secondary [of an ignition coil (x)] since said high-pressure diode had breakdown voltage higher than engine demand secondary voltage In order to discharge by inter-electrode [of an ignition plug], without being influenced of secondary by other ignition coils, ignition control is performed certainly. When the breakdown voltage of said high-pressure diode is lower than engine demand secondary voltage, the high-pressure diode of other ignition coils takes a break on low voltage, current is drawn out, and discharge with an ignition plug does not occur rather than an ignition plug discharges with the voltage generated in secondary [of an ignition coil (x)]. It connects with an ignition plug and the outgoing end through high-pressure diode carries out induction of the high voltage to this portion according to an ignition control signal. The ignitor unit is built in the ignition coil, respectively, and the power switching element consisted of IGBT(s), and has prepared the current-limiting circuit as a protection feature.

[0013] An example of a wave of operation of drawing 5 is shown in drawing 6 . This example is multiplex

ignition of eight totals which carry out repeat discharge of 4 sets of ignition coils twice. 127 -- the ignition control signal from ECU, and 128 -- the output signal (1) of a drive circuit, and 129 -- the output signal (2) of a drive circuit, and 130 -- for the primary current of a coil 1, and 133, as for the primary current of a coil 3, and 135, the primary current of a coil 2 and 134 are [the output signal (3) of a drive circuit, and 131 / the output signal (4) of a drive circuit, and 132 / the primary current of a coil 4 and 136] the multiplex ignition output voltage of this invention. In this example, the primary-current cutoff timing of each coil is giving delay about 0.3ms, and is taken as the control which terminates eight peak secondary voltage generating inside about 3ms. It can compute by the formula of theta=6NT, for example, the relation of whenever [this time amount and crank angle] is engine-speed 800 r/min. Since 3ms at the time is made whenever [crank angle] and becomes 14.4 degrees, this example serves as a system which obtains 8 times of generating peak secondary voltage among 14.4 degrees in 800 r/min.

[0014]

[Effect of the Invention] According to this invention described above, secondary [of two or more ignition coils prepared in juxtaposition] is separable. ** ignitionability which a **** engine has since the high voltage which an ignition coil generates becomes possible [it being impressed by the direct ignition plug and performing ignition control correctly] [bad] ** It becomes possible to supply the multiplex ignition which can solve the trouble of being easy to carry out a blowoff to ** turbulence and the swirl in which the electrode of an ignition plug tends to smolder in a powder smoke operation of rich gaseous mixture.

[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] It is the ignition for internal combustion engines characterized by to have composition of having been combined through said high-pressure diode with which a high-pressure edge of an ignition coil set two or more breakdown voltage as a value higher than engine demand secondary voltage in an ignition which prepared an ignition coil which consists of a primary coil combined magnetically and a secondary coil in two or more piece juxtaposition to an ignition plug prepared for every gas column of an internal combustion engine which injects a fuel directly into a gas column .
[Claim 2] An ignition coil for internal combustion engines characterized by setting it as breakdown voltage of 35kV or more of high-pressure diode in claim 1.
[Claim 3] It is the ignition method of an ignition of claims 1 or 2 which prepared an ignition coil of n (> 2) individual in juxtaposition. Energization of the first ignition coil is again started after primary-current cutoff of the second ignition coil. An ignition method of an ignition for internal combustion engines which is made to energize with the second -- and the n-th one by one, and is again characterized by twice [of a repeat / count] as many thing to do for multiplex ignition as n ignition coils for a start after the n-th cutoff termination -- and by carrying out sequential cutoff of the n-th and the primary current, and repeating this control.
[Claim 4] It is the ignition method of an ignition for internal combustion engines characterized by said n being 4 in claim 3.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The ignition system of a distributor method.
[Drawing 2] The example of a wave of operation of the ignition system of a distributor method.
[Drawing 3] The ignition system of an independent ignition method (a part for a 1 cylinder).
[Drawing 4] The example of a wave of operation of the ignition system of an independent ignition method (a part for a 1 cylinder).
[Drawing 5] The example of a configuration of the ignition of this invention.
[Drawing 6] The example of a wave of operation of the ignition of this invention.
[Description of Notations]
1, 12, 23 -- A dc-battery, 2, 13, 24 -- 3 ECU, 14 -- Ignition coil, 4, 15, 35 -- 6 An ignition plug, 18 -- 7 A primary winding, 19 -- Secondary winding, 9 20 [-- 17 An ignitor unit, 31 / -- High-pressure diode, 25 / -- A drive circuit, 36 / -- Multiplex ignition output voltage.] -- 10 An ignition signal wave form, 21 -- 11 A primary-current wave, 22 -- A secondary voltage wave, 16, 26, 27, 28, 29

[Translation done.]

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DRAWINGS

[Drawing 1]

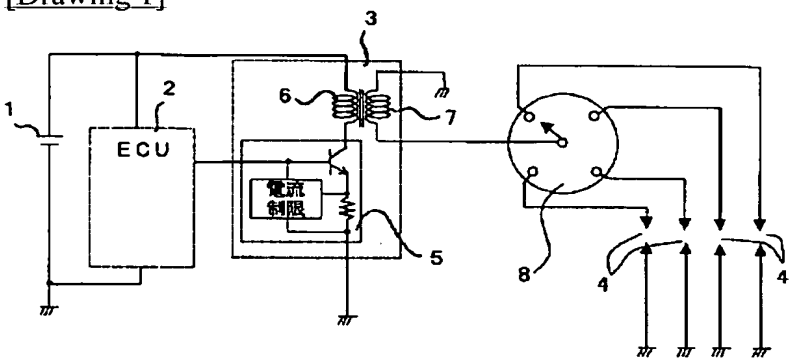


図 1

[Drawing 2]

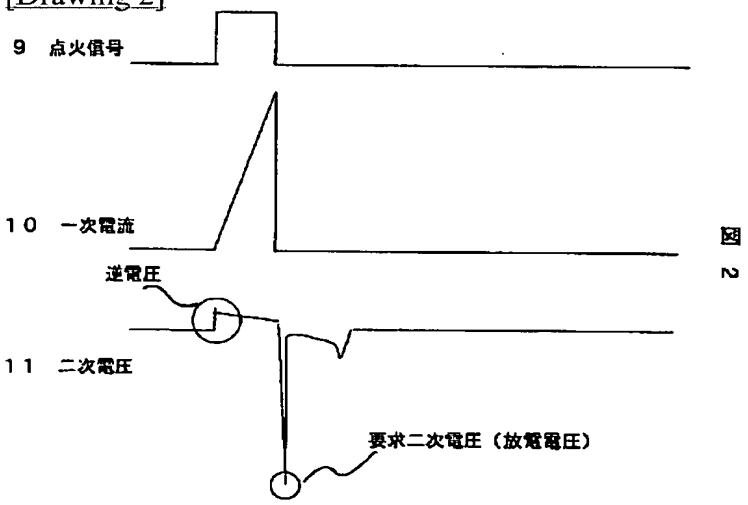
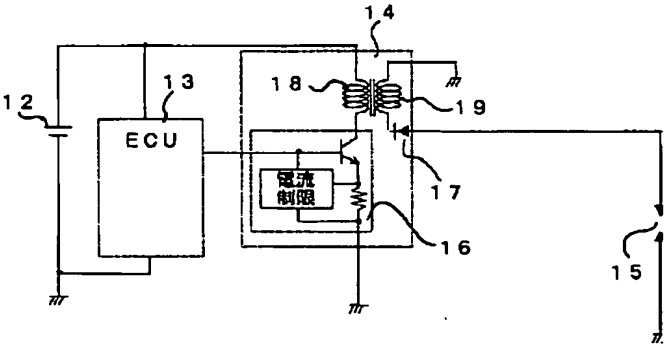


図 2

[Drawing 3]

図 3



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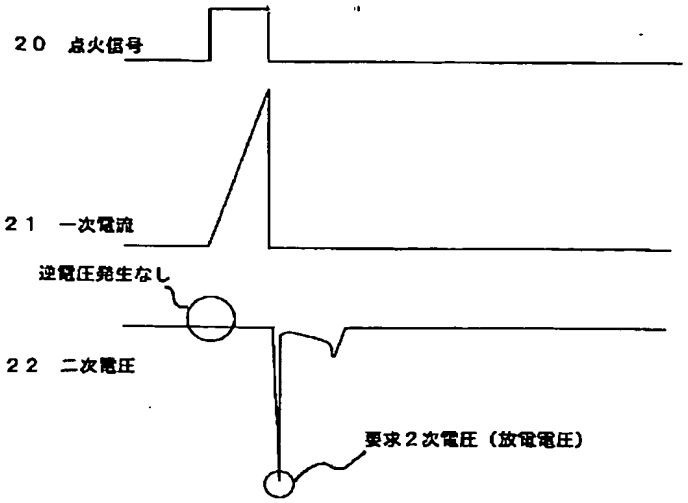
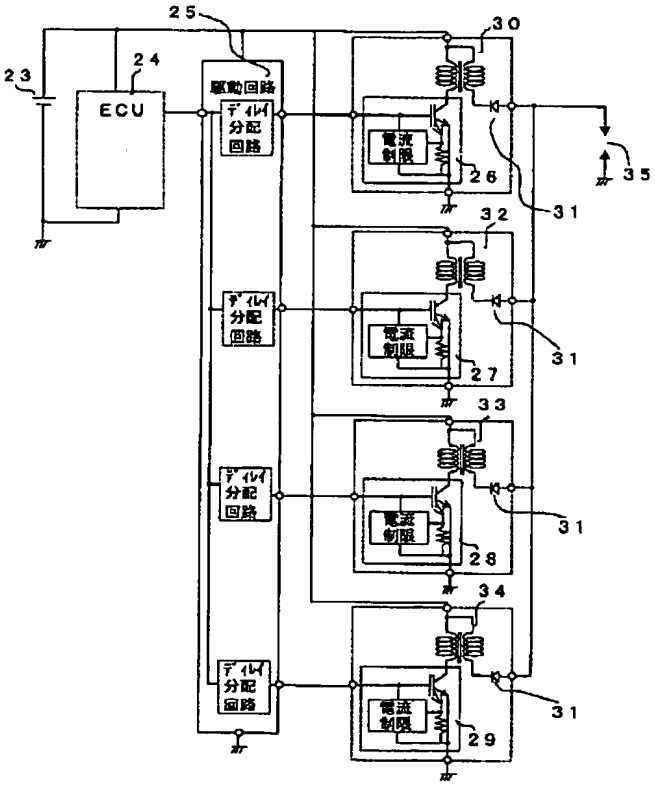


図 4

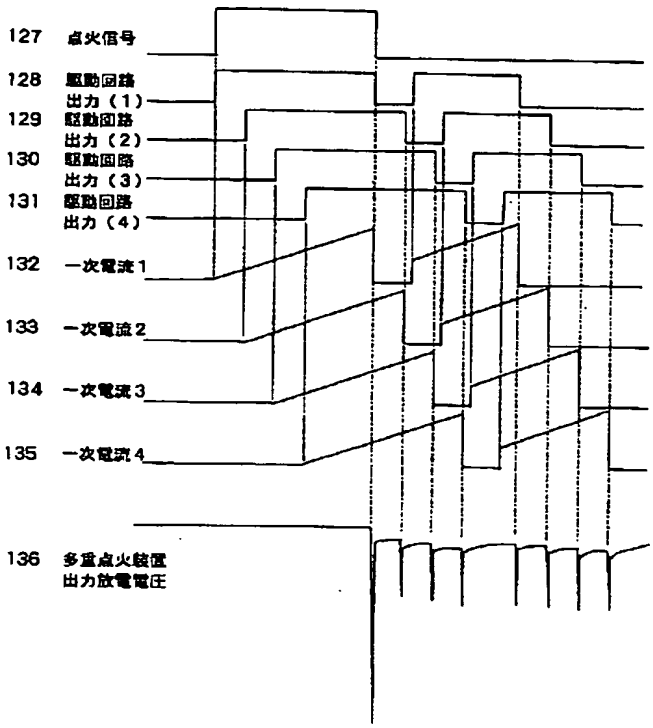
[Drawing 5]

図 5



[Drawing 6]

図 6



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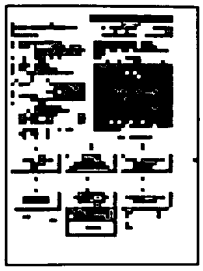
Kind: **A2** Document Laid open to Public inspection

Inventor: **ITO TAKASHI; KOBAYASHI RYOICHI; FUKATSU KATSUAKI; KONUKI HIROSHI; HIRAKAWA SATOSHI;**



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Assignee: **HITACHI LTD**
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INPADOC Legal Status: None

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Family:

PDF	Publication	Pub. Date	Filed	Title
☑	**JP2000009010A2**	2000-01-11	1998-06-19	IGNITION DEVICE FOR INTERNAL COMBUSTION ENGINE
☑	JP0009010A2	2000-01-11	1998-06-19	IGNITION DEVICE FOR INTERNAL COMBUSTION ENGINE
☑	DE19927960A1	1999-12-30	1999-06-18	Zuendvorrichtung und Zuendverfahren fuer Brennkraftmaschinen
3 family members shown above				

Other Abstract Info: None